

7. SOURCE WATER PROTECTION

In Washington State, water supply systems using a surface water source must develop and implement a watershed control program to protect the water supply and health of their customers. This chapter documents our watershed control program to protect the source water quality by identifying potential pollutant sources, raising public awareness, monitoring, and controlling all adverse effects to the best extent possible.

DOH classifies source water based on both vulnerability and susceptibility. Vulnerability is the water source's potential for contamination: the physical susceptibility to the infiltration of contaminants; and source's risk of exposure to contaminants. Susceptibility is determined by conditions that affect the movement of contaminants from the land surface into a water supply. DOH has classified our source water as LOW vulnerability and HIGH susceptibility.

The LOW vulnerability rating by ODW is only with regard to Synthetic Organic Compounds (SOC's) since there is a low use of SOC's in Lewis County. The water shed is MODERATELY vulnerable to Volatile Organic Compounds (VOC's). However, due to the abundance of roads and railroads within the water shed and in close proximity to the Cowlitz River, it would appear that the water shed should be rated as HIGH for vulnerability to potential contamination. The stated ratings ODW are only for VOC's and SOC's and not for all potential contaminants.

7.1 REGULATORY REQUIREMENTS

The adequacy of source water protection is evaluated in the following State code:

- WAC 246-290-135(5) Source Protection
- WAC 246-290-668 Watershed Control
- WAC 246-290-678 Reliability for Filtered Systems

Source Protection

The watershed control program must include a description of the watershed including location and size, hydrology, land ownership and activities that may adversely affect source water quality according to WAC 246-290-135(5). Additional descriptive elements include: relevant written agreements, monitoring activities and assessments of water quality.

Watershed Control

The watershed control program must be evaluated at least every six years with a description of the watershed and characterization of the hydrology according to WAC 246-290-668. All changes over the previous six years must be described. A monitoring program must also be in place to assess the adequacy of the watershed control plan.

Reliability

Water systems with a filtration system must have reliability features according to WAC 246-290-678. Some reliability features include: alarm devices, standby replacement equipment and redundant multiple filter units.

7.2 WATERSHED CONTROL PROGRAM

7.2.1 Watershed Description and Characteristics

Our intake structure is at River Mile 27 on the Cowlitz River, approximately 9.5 miles upstream from its confluence with the Toutle River. The watershed drainage area above the intake is approximately 1,400 square miles with elevations ranging from 70 ft at the intake structure to about 14,000 ft at the headwater on the east side of Mt Rainier. Figure 7.1 shows the watershed boundaries above the intake structure. This watershed is the northwestern portion of Water Resource Inventory Area (WRIA) Number 26, the Lower Cowlitz River Basin. Tributaries within the watershed include:

- Coon Creek
- Foster Creek
- Bear Creek
- Lacamas Creek
- Salmon Creek
- Blue Creek
- Otter Creek
- Brights Creek
- Cispus River
- Tilton River

The terrain within the basin varies from the steep snow and glacier covered slopes of Mt Rainier and the Cascade Mountain Range down to the gentler valley slopes along I-5. The vegetation is predominately forestland with developed towns and communities along SR 12. Figure 7-2 is a map of public lands in WRIA 26 as mapped by Ecology in October 2011.

7.2.2 Identification of Activities and Land Uses Affecting Water Quality

Ownership and land use within the basin varies due to the extreme size of the watershed. Ownership is made up of public lands (Mt Rainier National Park, Gifford Pinchot National Forest, Tatoosh Wilderness, Tacoma Power, State Parks) and private lands. Much of the land is privately owned with large tracts owned and managed for commercial timber harvesting by Weyerhaeuser Corporation, West Fork Timber, and Port Blakely. See

Figure 7-3 is a map of land use and land cover in WRIA as mapped by Ecology in February 2002. A summary of the land cover in WRIA 26 is shown in Table 7.1.

TABLE 7.1 – WRIA 26 LAND COVER		
CATEGORY	SUB-CATEGORY	ACREAGE (ac)
Developed	Residential	4,102
	Business	740
Agriculture		72,597
Forest	Conifer	154,154
	Hardwood	22,751
	Mixed	11,287
Non-Forested, Logged		22,678
Aquatic	Lakes, Shoreline Marshes	99

	Riparian, Rivers	3,449
TOTAL		291,857

There are three major dams in the Cowlitz River basin upstream of our intake: 1) Cowlitz Falls Dam built in the 1990s, owned and operated by the Lewis County Public Utility District with storage in Lake Scanewa; 2) Mayfield Dam built in 1963 and 3) Mossyrock Dam built in 1968. The City of Tacoma owns and operates the latter two dams for hydropower, recreation and flood control.

Mass wasting from landslides, timber harvesting and other man made activities coupled with large precipitation events often result in high instream turbidity, but the Mayfield Lake Dam and the Mossyrock Dam generally act as large sedimentation basins. High turbidity at our intake occurs when Tacoma Power draws down the lakes in anticipation of heavy precipitation and snowmelt events. Tacoma Power alerts Lewis County Emergency Management and local agencies when drawdown flows exceed 20,000 cfs; however, high turbidity at the intake is seen at lesser drawdown flows.

High turbidity at the intake is also seen seasonally when specific riverside vegetation is in bloom such as cottonwood.

Developed lands and agriculture in the upper WRIA 26 are land uses with the potential to affect water quality with the presence of fecal coliform and high nitrates. However, these effects are generally out weighted by the larger acreages of forest and aquatic lands; and treated by the wastewater systems of the rural cities and communities (Morton, Mossyrock and Toledo). These effects are further diluted by the Mayfield Lake Dam and the Mossyrock Dam.

Wildfire is a natural hazard in the county according to the *Lewis County Multi-Jurisdictional Hazard Mitigation Plan adopted July 26, 2010*. The losses from wildfires are destruction of habitat, timber, property and watersheds. Then there is the heightened vulnerability to flooding and mass wasting which are detrimental to water quality.

Lewis County ranked earthquakes, landslides and wildfires as secondary natural hazards. The City of Vader also participated in the multi-jurisdictional hazard mitigation plan project. Although Vader noted “no prior and unlikely to experience” these hazards, Vader acknowledged the catastrophic effect to city residents.

7.2.3 Watershed Management and Control Measures

Management of the upstream activities of the large land use categories are regulated by other federal, state and local agencies. For example, timber harvesting and farming activities by the State Department of Natural Resources under Forest Practices Act; dam operations by the Federal Energy Regulatory Commission; NPDES permitting by the State Department of Ecology; construction in waterways by the State Department of Fish and Wildlife; public road construction by Lewis County and State Department of Transportation (WSDOT); private road construction and stormwater management of new impervious surfaces by Lewis County, and local building and land development activities by Lewis County.

One existing control measure is the review of proposed building and land development activities. Our staff is also involved in reviewing project environmental checklists and issuing development

permits. Proposed projects near the river intake and in our service area are flagged in GIS databases used in the county building and land development review process.

We respond to utility locate requests from Underground Locate in our water service area. Although our focus is primarily to protect our infrastructures, this request provides an opportunity for us to talk to contractors and homeowners; and to informally review their project.

We support efforts for point source control projects such as local and regional wastewater treatment improvement projects. For example, the City of Toledo is the nearest upstream city and has a proposed wastewater treatment facility plant upgrade project.

The water intake facility is on property provided to the county utility by easement. The property is undeveloped and used for riverside recreation. Lewis County improved access control by changing the locks immediately in 2011, granting access only to the owner and approved utility personnel, and monitoring the gate and intake facility daily.

7.2.4 Monitoring Program

Monitoring at the source intake is made of continuous turbidity readings and fecal coliform bacteria samples.

There are monitoring programs of the Cowlitz River performed by others. Although their data may not be immediately available, it is as useful as a “report card” of the river and for a long-term water quality trend.

State Department of Ecology monitors water quality on the Cowlitz River at two stations. The Cowlitz at Kelso has been in operation since 1960 and the summary is “Overall water quality at this station met or exceeded expectations and is of lowest concern. (based on water-year 2013 summary)”. The other station is on Lacamas Creek at SR 506 located about 0.2 mi upstream from the confluence with the Cowlitz River. The confluence is approximately one mile upstream of our river intake. The Lacamas Creek station has one year of monitoring and the preliminary summary is “Overall water quality at this station is of moderate concern. (based on water-year 2013 summary)”. Ecology samples for the following parameters: conductivity, fecal coliform, flow, nitrate-nitrite, phosphorous, nitrate+nitrite-nitrogen, oxygen, pH, temperature and turbidity.

Another monitoring program is the USGS streamflow program. The closest river gage to the intake structure is USGS Station 14238000 located below the Mayfield Dam. Mean annual flow at the gage from 74 years of data is 7,110 cfs and extreme high and low flows are 22,900 cfs and 1,520 cfs, respectively. Instantaneous flow data can be accessed from the USGS site and from the Lewis County website through the river gage map. We use this site when heavy rains are in the forecast and there is the likelihood of high flow releases by Tacoma Power.

7.2.5 System Operations

We have reliability features in place. Water quality at the Cowlitz River intake is monitored daily. Alarms are in place to alert personnel about high turbidity readings, river level and power outage. We keep an inventory of feeder pumps and replacement parts along with maintaining vendor lists and accounts to expedite purchase of parts and equipment. We also have agreements set with other nearby utilities and municipalities for assistance and to share resources.

7.2.6 Future Watershed Protection Efforts

The County will conduct an inventory of potential contaminate sources using Ecology's Facility/Site Identification Database. This database lists any operation that is a potential or active source of pollution. Because of the vast size of the upstream lands, the evaluation will likely focus on the most effective areas. The geographical areas of concern are likely to be:

- Within a 0.25 mile buffer from the river intake at River Mile 27 on the Cowlitz River.
- Within the water utility service and facility areas.
- Within a 200-ft or as determined buffer from the water utility service and facility areas.

The County will develop efforts to protect the land around our river intake facility such as a watershed control plan agreement or a conservation easement with the property owner.

WRIA 26 (Cowlitz) & Vader Surface Water Intake Lewis County, Washington



O:\maps\water-sewer\Vader\intake_and_WRIA_26.mxd

Oct. 7, 2014

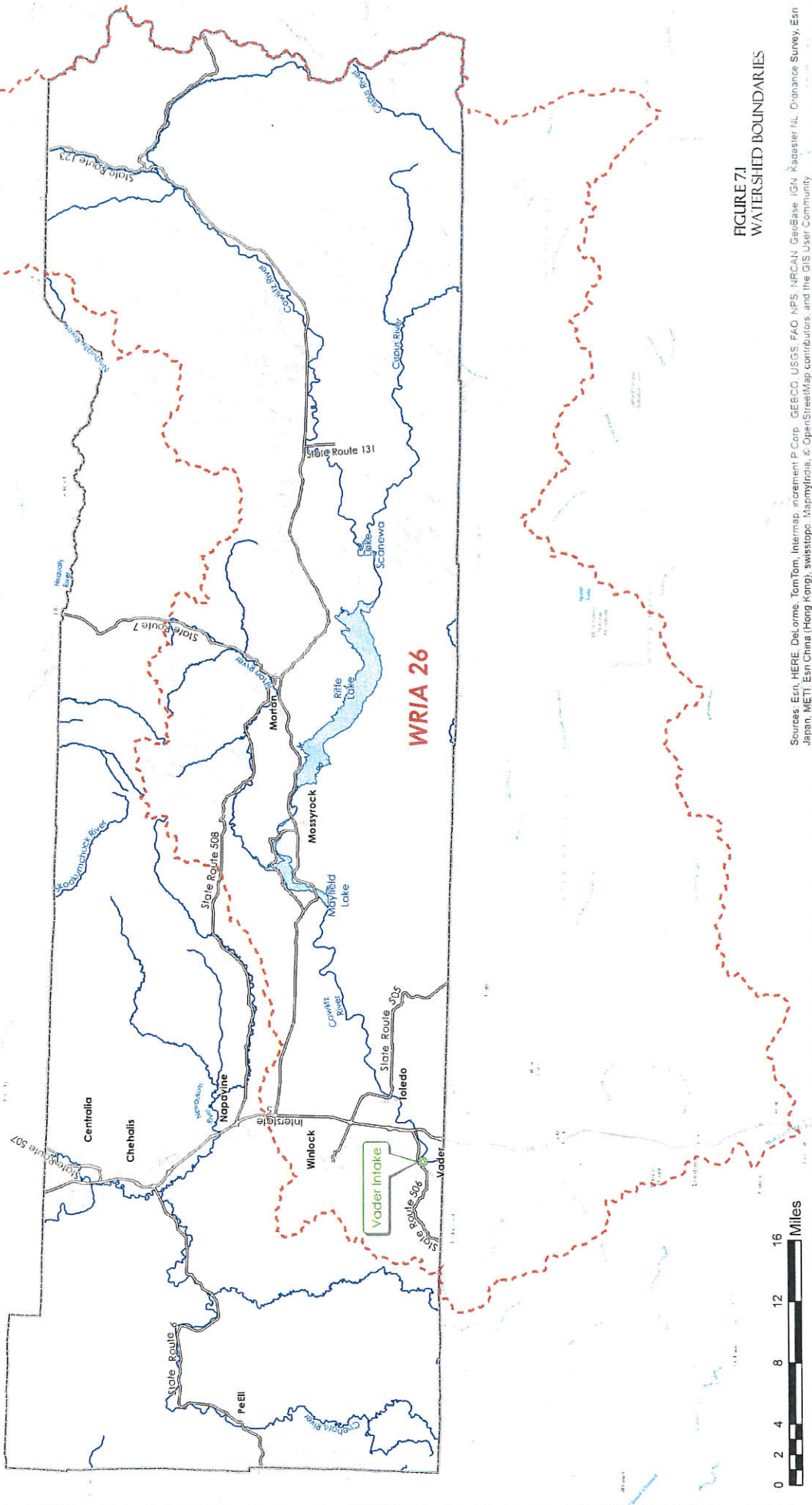
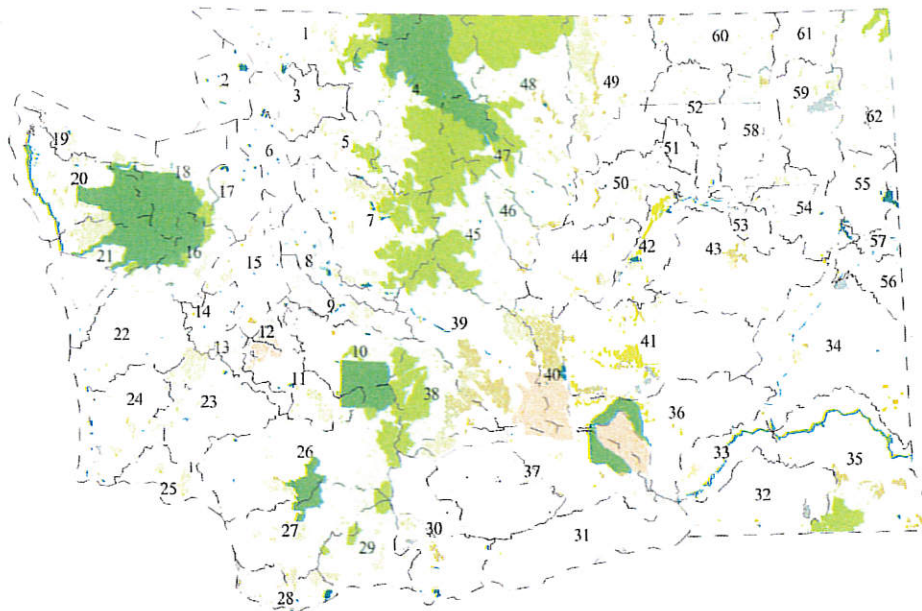


FIGURE 7J
WATERSHED BOUNDARIES

Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), Swisstopo, Mapbox, Mapbox, and the GIS User Community



Water Resource Inventory Areas and Major Public Lands WRIA/Land Management Key Page For Maps mpl1 - mpl62

	US Forest Service		Incorporated City
	USFS Wilderness Area		Unincorporated - Urban Growth Area (UGA)
	US Park/Recreation/Monument		Federal/State Highway
	US Fish and Wildlife		Major Road (paved)
	US Bureau of Land Management		Major Road (unpaved)
	US Bureau of Reclamation		Airport
	US Defense/Energy		Rail
	Wa. Dept. of Natural Resources		Ferry
	Wa. Dept. of Fish & Wildlife		Rivers/Streams
	Wa. Parks & Recreation		Canal/Pipe
	Public School/Hospital/Prison		WRIA
	Municipal, Park		County
	Municipal, Watershed		Campground
	Tribal Lands		Boat Launch
	Inventoried Roadless Area (IRA)		

Ecology - Water Resource Inventory Areas 2000 1:24K
 WDNR - Major Public Lands 2011 1:24K
 WDNR/Ecology - County Boundaries 2003 1:24K
 WDFW/Ecology - Hydrography 2005 1:100k
 WDOT/WDNR - Transportation 2007 1:24k
 Ecology - City/UGA 2011 1:24k
 RCO - Boat Launch 2006 1:24k
 USFS - IRA 2000 1:24k

The Dept. of Ecology makes no guarantee for the accuracy of data represented on these maps.
 Access to some Public and Tribal land may be restricted.

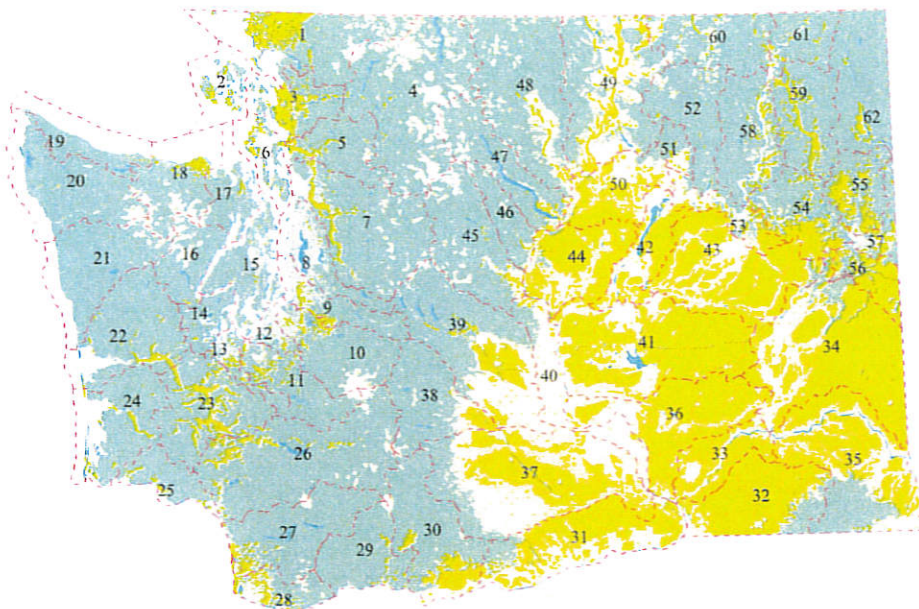


GIS Technical Services

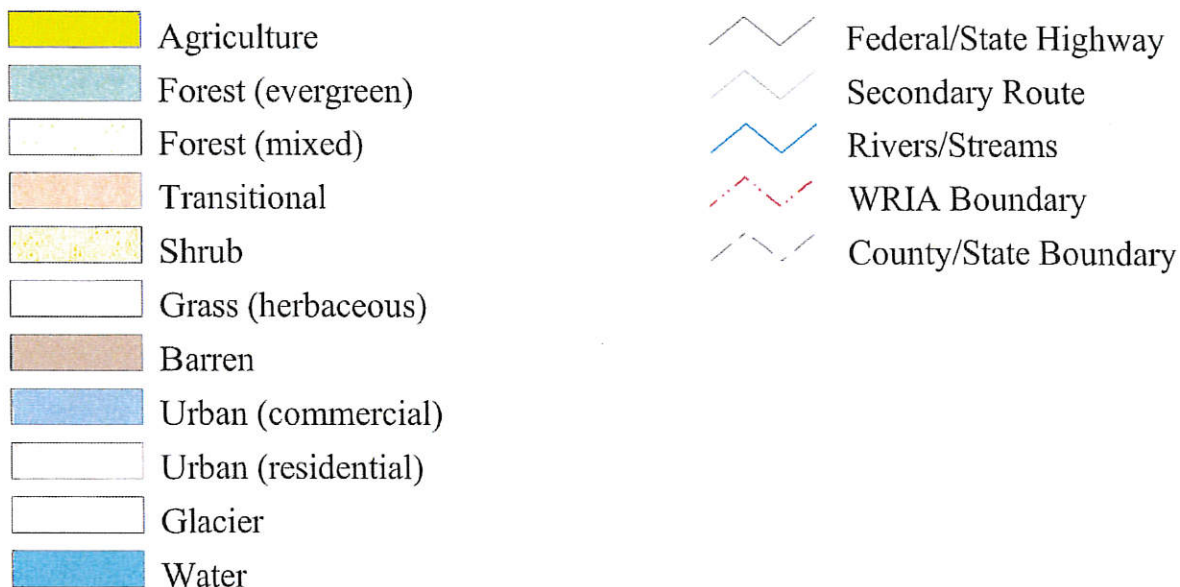
10/12/11

FIGURE 7.2
LAND TYPES IN WATERSHED

This map illustrates the Okavango Delta region in Botswana, highlighting the extensive wetland area and its surrounding landscape. The Okavango River is shown flowing from the north into the delta, with numerous tributaries such as the Boteti, Nuanetsi, and Ntloetsi rivers. Major towns and cities are marked, including Gaborone, Francistown, and Tlokweng. The map also shows the location of several protected areas, including the Okavango Delta, the Tlokweng Game Reserve, and the Nuanetsi Game Reserve. A legend in the bottom left corner identifies symbols for the Okavango Delta, the Tlokweng Game Reserve, the Nuanetsi Game Reserve, and the Boteti River. A scale bar in the bottom right corner indicates distances in kilometers, and a north arrow is located in the top right corner.



Water Resource Inventory Areas and Land Use/Land Cover



Note: Not all colors/types represented in image above

Land Cover Source:

Land Use/Land Cover - USGS 2000 National Land Cover Data
Multi resolution Land Characterization (MRLC), 30 meter
resolution Landsat TM data, 1986 - 1996.
<http://landcover.usgs.gov/nationallandcover.html>

Other data:

WDNR/ECOLOGY - Water Resource Inventory Areas 1999 1:24K (WRIA)
WDFW/ECOLOGY - Hydrography 1998 1:100k (HYDROFW)
WDOT - Transportation 2000 1:24k (SR24K,ROADS24K)



GIS Technical Services

02/26/02

FIGURE 7.3
LAND USE & LAND COVER
IN WRIA 26

Cowlitz Water Resource Inventory Area (WRIA) #26

